

MEMORANDUM


**DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF LAND PROTECTION AND REVITALIZATION
OFFICE OF SPILL RESPONSE AND REMEDIATION**

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SUBJECT: Quality Assurance Project Plan for the State Lead Program, Revision 1, Document Number 00-2014

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DATE: March 30, 2012

Summary:

The Department of Environmental Quality (DEQ) Storage Tank Program investigates reports of petroleum releases and ensures they are characterized and cleaned up to prevent risk to human health and the environment. When a tank owner or operator is unknown, unable, or unwilling to investigate and clean up a petroleum release, the DEQ, through its State Lead Contractors conducts work related to characterizing and cleaning up the release. The purpose of the Quality Assurance Project Plan for the State Lead Program is to ensure that procedures used and data collected by DEQ State Lead contractors are of sufficient quality to support the decisions that must be made by agency staff. The document is revised at this time to incorporate recent changes to both the Storage Tank Program's procedures and the Department's organizational structure.

Electronic Copy:

An electronic copy of this guidance in PDF format is available for staff internally on DEQNET, and for the public on DEQ's website at: <http://www.deq.virginia.gov>.

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Disclaimer:

This document is provided as guidance and, as such, sets forth standard operating procedures for the agency. However, it does not mandate any particular method nor does it prohibit any particular method for the analysis of data, establishment of a wasteload allocation, or establishment of a permit limit. If alternative proposals are made, such proposals should be reviewed and accepted or denied based on their technical adequacy and compliance with appropriate laws and regulations.

**VIRGINIA DEPARTMENT OF ENVIRONMENTAL
QUALITY
STORAGE TANK PROGRAM**

Quality Assurance Project Plan – State Lead Program

Revision 1

(January 20, 2012)

Document #00-2014

Quality Assurance Project Plan State Lead Program

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Glossary of Acronyms

AAF – Activity Authorization Form

AST – Above Ground Storage Tank

AWS – Alternate Water Supply

BTEX – Benzene, Toluene, Ethylbenzene, and Xylenes

CAP – Corrective Action Plan

CFU – Carbon Filtration Unit. Within the context of this document and program, a carbon filtration unit may refer not only to the carbon canisters, but to the entire treatment train used to remove organic constituents from a private water supply. The treatment train typically includes, but is not limited to, pre-filters for sediment, carbon canisters, and an ultraviolet disinfection unit.

DCLS – Division of Consolidated Laboratory Services. The Division of Consolidated Laboratory Services is a unit within the Virginia Department of General Services and is the state's laboratory.

DEQ – Virginia Department of Environmental Quality

DIPE – Di isopropyl Ether

DRO – Diesel Range Organics

EDB – Ethylene Dibromide, a.k.a. 1, 2 dibromoethane

GC/MS – Gas Chromatography/Mass Spectrometry

GRO – Gasoline Range Organics

HCL – hydrochloric acid

MTBE – Methyl Tertiary Butyl Ether

OSRR – Office of Spill Response and Remediation. The Virginia Department of Environmental Quality Central Office unit responsible for overseeing storage tank regulatory compliance and ensuring that release response and corrective actions are taken following a petroleum release.

PAHs – Polynuclear Aromatic Hydrocarbons

PC# - Pollution Complaint Number. All potential or confirmed releases of petroleum into the environment are assigned a pollution complaint number by the Virginia Department of Environmental Quality.

PRP – Pollution Response Program

PTFE – polytetrafluoroethylene (a.k.a. Teflon®)

QA – Quality Assurance

QAPP – Quality Assurance Project Plan

QC – Quality Control

RO – Regional Office

RP – Responsible Person. This is the entity responsible for initiating release response and corrective action following a petroleum release.

RPD – Relative Percent Difference

SCR – Site Characterization Report

SVOCs – Semi-volatile Organic Compounds

TAME – Tertiary Amyl Methyl Ether

TBA – Tertiary Butyl Alcohol

TPH – Total Petroleum Hydrocarbons

UST – Underground Storage Tank

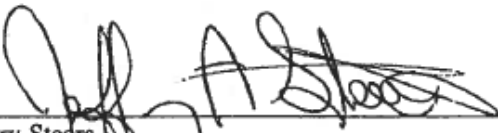
VELAP – Virginia Environmental Laboratory Accreditation Program

VOCs – Volatile Organic Compounds

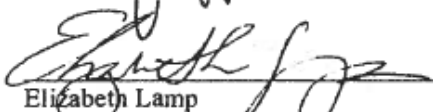
VPDES – Virginia Pollution Discharge Elimination System

State Lead Program - Quality Assurance Project Plan Approval


The Virginia Department of Environmental Quality, Storage Tank Program has developed this Quality Assurance Project Plan (QAPP) to document the procedures, roles, and responsibilities associated with the State Lead Program.



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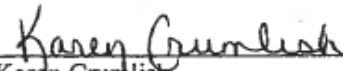
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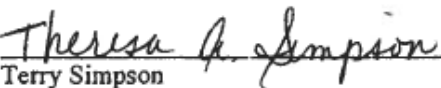
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QUALITY ASSURANCE PROJECT PLAN

State Lead Program

1.0 INTRODUCTION

The Virginia Department of Environmental Quality (DEQ) Storage Tank Program is responsible for ensuring that human health and the environment are protected from releases of petroleum and regulated substances from storage tanks. When a release occurs from a storage tank, the DEQ will direct the responsible person (RP) to initiate release response and corrective action. If DEQ cannot find the RP or the RP is unwilling or unable to conduct the necessary work, the DEQ can investigate and clean up the release under the State Lead Program.

The DEQ, as part of its grant commitment with EPA, is required to have quality management procedures in place for data collection activities that receive or may receive federal funding. This Quality Assurance Project Plan (QAPP) is developed jointly by the DEQ Storage Tank Program staff serving within the Central and Regional Offices. The purpose of this quality assurance project plan is to ensure that procedures used and data collected by the State Lead Contractor(s) are of sufficient quality to support decisions made during the processes of release response and corrective action at leaking storage tank sites taken into the State Lead Program.

2.0 PROJECT DESCRIPTION AND MANAGEMENT

The DEQ Storage Tank Program is responsible for ensuring that human health and the environment are protected following releases of petroleum into the environment. When petroleum is released from a storage tank, the owner or operator of that tank and/or the spiller (Article 11 cases) is responsible for stopping the release, characterizing the site, and cleaning up the release. Investigations and cleanups conducted by the responsible person (RP) are referred to as “RP Lead” cleanups by the Storage Tank Program.

In a relatively small percentage of the petroleum releases, DEQ investigates the release and finds that the RP no longer exists or is unwilling or unable to conduct the cleanup. In these instances, the DEQ Storage Tank Program may place the site in the State Lead program. Once a site is placed in the State Lead Program, the regional staff will evaluate the site and compare the need for corrective action at this site with the need for corrective action at other State Lead sites during a particular fiscal year. Once the regional staff determines that the State Lead site is appropriately prioritized and ranks for inclusion in a fiscal year budget, the Regional Office will initiate site clean-up activities.

2.1 Project Responsibilities

When a site is placed in the State Lead program, DEQ, Storage Tank Program staff and managers must evaluate the site and rank that site relative to all other state lead sites in that region for a particular fiscal year. Once the region initiates clean up activities at a State Lead site, all persons involved with the State Lead program are responsible, either directly or indirectly, for the quality of data generated as part of this program and for the decisions that are made based upon the data that is collected. Sections 2.1.1 through 2.1.9 describe the roles and responsibilities of DEQ staff, managers, and the State Lead contractor(s). An organizational chart illustrating the lines of formal and functional communication within the State Lead Program is included in Appendix A.

2.1.1 Regional Case Manager

Petroleum releases must be reported to staff at the appropriate DEQ Regional Office. Upon receiving a report of a petroleum contamination, the Regional Storage Tank Program Manager will direct one of the Regional Case Managers to investigate the report. The individual Case Manager to whom the case is assigned is responsible for investigating the report and determining if a petroleum release has occurred. If the Case Manager determines that a release has occurred, the Case Manager will direct the RP to undertake release response and corrective action.

The Case Manager also is responsible for identifying cases that are eligible for the State Lead program. In general, petroleum contamination from Underground Storage Tanks (USTs), Above Ground Storage Tanks (ASTs), or unknown sources may be eligible for the State Lead program if:

1. The tank owner or operator is unknown;

2. The owner or operator is financially incapable of undertaking release response and corrective action; or
3. The owner or operator unwilling to take appropriate actions and immediate corrective action is needed at the site.

A State Lead Program eligibility flowchart is included as Appendix B.

NOTE: When a release from a regulated UST is reported to the DEQ, Storage Tank Program staff will attempt to determine the RP for the release. In most instances, an RP is identified and release investigation, response, and/or remediation will proceed as an “RP lead site.”

Once a State Lead site has been prioritized and the regional staff determines that the fiscal year budget allocation will allow for release investigation, response, and corrective action activities at the site, the DEQ regional staff may initiate these activities by contacting the State Lead Contractor and requesting the preparation of an Activity Authorization Package for the site. The Regional Case Manager for the particular site and the State Lead Contractor will work together to determine the actions needed to meet remediation goals for the site. The Contractor will place the activities needed to complete the scope of work on an Activity Authorization Form (AAF) and submit this form to the Regional Case Manager for approval.

After the Regional Case Manager approves the first AAF for the site, the Regional Case Manager must notify (or direct the Contractor to notify) the property owner(s) and obtain the site access needed to conduct the agreed upon scope of work. Once site access is obtained, site work may be initiated on a schedule agreed to by the Regional Case Manager and the Contractor.

Once a phase or sub-phase of work is completed at a State Lead site, the Contractor usually will provide a written report to the Regional Office summarizing the work performed and providing information needed to determine the future course of action at the site.

2.1.2 State Lead Program Manager

Storage Tank Program staff in both the Regional Offices (RO) and Office of Spill Response and Remediation (OSRR) share in the responsibilities for implementing the State Lead Program. Contract management of the State Lead Program is administered by the State Lead Program Manager in OSRR.

The Storage Tank Program personnel in OSRR and the Regional Offices develop standard operating procedures for the State Lead Program jointly. The State Lead Program Manager is responsible for coordinating the development of standard procedures for the State Lead Program and modifying existing procedures as needed. The State Lead Program Manager along with other Central Office Staff will assist the Regional Case Manager as needed with release investigations and evaluating corrective action plans for impacted sites.

Quality assurance documents for the State Lead Program are developed jointly by Storage Tank Program Staff from OSRR and the Regional Offices. The State Lead Program Manager will assist the Storage

Tank Quality Assurance Manager with the development of quality assurance documents and procedures for the State Lead Program. The State Lead Program Manager also will assist the Storage Tank Program Quality Assurance Manager with audits and evaluations of the Quality Management system used within the State Lead Program.

NOTE: At the time this Quality Assurance Project Plan was written, the State Lead Program Manager also was responsible for performing the duties of the Storage Tank Program Quality Assurance Manager.

2.1.3 OSRR Staff and Management

Technical guidance and procedures within the DEQ Storage Tank Program are developed jointly by OSRR staff/management and regional staff/management. Once a procedure is adopted by OSRR and the regions, OSRR staff and management provide a written copy of the guidance or procedure to OSRR and Regional staff.

OSRR staff and management also are responsible for developing the quality assurance documents that are needed within the Storage Tank Program. As with other technical documents, OSRR staff members incorporate comments from other Central and Regional Office staff into the Quality Assurance documents. OSRR staff must update and revise quality assurance documents as needed.

2.1.4 Petroleum Programs Legal Coordinator

During the course of determining the RP for a release, Regional Case Managers may encounter unusual circumstances and documentation that can affect the RP evaluation process. The Petroleum Programs Legal Coordinator in OSRR will assist Case Managers with RP evaluations as needed.

2.1.5 Financial Responsibility Manager

Inability to pay for the necessary corrective actions is a claim that is frequently made by RPs. If an RP claims to be financially incapable of proceeding with corrective action, even after considering reimbursement from the Fund, regional staff should inform the Financial Responsibility Manager in DEQ's Office of Financial Assurance so that an inability to pay application and additional guidance may be provided to the RP. Information that regional staff must provide to the Financial Responsibility Manager include:

1. Responsible person name;
2. Responsible person address;
3. Responsible person telephone number(s);
4. Pollution complaint number;
5. Site name;
6. Number and type of occurrences;
7. Release report date;

8. Identification of RP's type of business entity:
 - A. Individual/sole proprietorship;
 - B. Bankrupt;
 - C. Corporation;
 - D. Partnership;
 - E. Estate;
 - F. Non profit organization; or
 - G. Other (limited liability company, government entity, etc.).
9. Filing deadline for the next report required for the case.
10. Whether a responsible person filed a tax return the previous year (this only applies to individuals).

Upon receiving this information, the Financial Responsibility Manager will contact the RP and send the necessary forms and instructions to that person. The Financial Responsibility Manager also will copy the Regional Office on correspondence with the RP.

After receipt of the completed claim form and other financial information, the Financial Responsibility Manager will perform the Ability-to-Pay analysis. If the RP has been determined to be unable to pay but the site has not yet been referred for state lead, the Financial Responsibility Manager will copy the Regional Office on the determination letter sent to the responsible person. In addition, the Financial Responsibility Manager will provide a written indication of ability to pay to the appropriate Regional Office. If the RP is determined to be able to pay, the Financial Responsibility Manager will copy the Regional Office on the Ability-to-Pay determination letter sent to the RP.

2.1.6 Regional Storage Tank Program Manager

The Regional Storage Tank Program Manager is responsible for overseeing all activities performed by Storage Tank Program staff in that region. The Regional Storage Tank Program Manager assigns release reports to individual Case Managers and ensures that these releases, suspected or confirmed, are investigated in accordance with DEQ procedures.

The Regional Storage Tank Program Manager and/or a person designated by the Regional Storage Tank Program Manager is responsible for assisting OSRR with the development, review, and revision of program procedures. The Regional Storage Tank Program Manager is also responsible for ensuring that all staff members performing work on a project are familiar with Storage Tank Program standard procedures.

2.1.7 DEQ State Lead Contractor

The State Lead Contractor performing work for the Storage Tank Program is an integral component of the Quality Assurance process. The State Lead Contractor may, depending upon the scope of work for the site, close USTs, investigate petroleum contamination to determine the source of that contamination, characterize a site following a release, and implement corrective actions to clean up a release.

When a DEQ Regional Case Manager contacts the State Lead Contractor about performing work at a site, the State Lead Contractor must work with the Regional Case Manager to determine an appropriate scope of work for the site. The State Lead Contractor will prepare and submit a State Lead AAF to the Regional Case Manager for the scope of work to be performed for the site. After the State Lead AAF is approved, the contractor will initiate the specified scope of work.

The State Lead Contractor is the primary entity collecting data for State Lead site. DEQ relies on the data collected by the State Lead Contractor to determine the actions that are necessary to protect human health and the environment at a State Lead site. The State Lead Contractor is responsible for ensuring that staff performing field work and collecting environmental data are trained to collect that data and are familiar with standard sample collection procedures.

The Quality Assurance Project Plan for the State Lead Program incorporates elements from both the DEQ and the State Lead Contractors. Each State Lead Contractor is responsible for providing the company's standard sampling and document management procedures to DEQ as a condition of this contract. If existing sampling, document, or other quality management procedures used by the State Lead Contractor are not expected to meet data quality objectives for a site, the State Lead Contractor must contact the Regional Case Manager. The State Lead Contractor and the Regional Case Manager must then evaluate the identified problem, initiate the agreed upon corrective measures to address the identified problem, and document these activities in the Regional case file.

Note: The State Lead Program Manager and the Storage Tank Program Quality Assurance Manager will assist the State Lead Contractor and Regional Case Manager with evaluating and selecting case specific corrective measures if assistance is requested.

2.1.8 Storage Tank Program Quality Assurance Manager

The Quality Assurance Manager for the Storage Tank Program is responsible for developing, maintaining, and updating all quality assurance documents for the State Lead Program. This person also must:

1. Develop and distribute quality assurance documents, policies, and procedures to all persons working in the State Lead Program;
2. Assess the effectiveness of quality assurance procedures for the State Lead Program;
3. Record the results of Data Quality Audits, Technical Assessments, and other assessments related to quality assurance within the State Lead Program;
4. Report the results of Data Quality Audits, Technical Assessments, and other assessments related to quality assurance within the State Lead Program to OSRR Management, the State Lead Program Manager, the Regional Storage Tank Program Manager and Regional Case Managers;
5. Work with DEQ Central and Regional Office Storage Tank personnel to identify deficiencies in the quality assurance process and determine the actions needed to correct those deficiencies; and
6. Identify training needs and report those needs to the Director of OSRR and the Regional Storage Tank Program Managers.

The Storage Tank Program Quality Assurance Manager also may assist the State Lead Manager with the

development, review, and revision of State Lead procedures. The Storage Tank Program Quality Assurance Manager also is available to assist the Regional Case Managers as needed.

NOTE: At the time this Quality Assurance Project Plan was written, the Quality Assurance Manager and the State Lead Program Manager responsibilities were being undertaken by one person.

2.1.9 DEQ WQM Quality Assurance Officer

The DEQ WQM Quality Assurance Officer will review quality assurance documents developed by the Storage Tank Program and assist the Storage Tank Quality Assurance Manager with auditing and assessing Quality Assurance/Quality Control (QA/QC) procedures used by this program. The DEQ WQM Quality Assurance Officer is outside of the Storage Tank Program chain-of-command and is expected to add a level of objectivity to QA/QC reviews and audits.

The DEQ WQM Quality Assurance Officer reviewed and approved the Quality Assurance Project Plan for the State Lead Program before the plan was completed. The Quality Assurance Officer will also be involved in the review of all major revisions of this Project Plan.

Technical System Audits and Management System Reviews of the State Lead Project Plan will be coordinated by the Storage Tank Program Quality Assurance Manager. The DEQ WQM Quality Assurance Officer will assist with Technical System Audits and Management System Reviews.

2.2 Data Quality Objectives

Data quality objectives are primarily based upon the decisions that the data must support. Once a release has been reported to or discovered by DEQ, the next step in the release response and corrective action process usually involves determining the person responsible for cleaning up the release. Information collected in this area is critical from a resource management perspective. The DEQ seeks to have the person responsible for cleaning up the release manage the actual clean-up process. This allows DEQ staff and the State Lead Contractor to spend additional resources in areas where those resources are required.

Work performed by the State Lead Contractor to characterize and clean up releases may vary greatly from one site to the next or from one corrective action phase to the next phase at a particular site. The data quality objectives for data collected as part of the State Lead Program vary depending upon the decisions that must be made at the site during a particular phase of work. Data that are collected to characterize a release must provide information about the severity and extent of contamination at the site and be capable of enabling the State Lead Contractor and DEQ staff to evaluate risks to receptors and remedial alternatives at the site. Data that are collected after a remediation system is installed may be used to evaluate the effectiveness of the remediation system. In all instances, the DEQ Regional Case Manager and the State Lead Contractor are expected to decide upon a scope of work and data quality objectives for a particular phase of work at a site before that scope of work is initiated.

2.2.1 Data Quality Needs – Tank Closure Samples

Tank closure, while not the most common type of work that will be performed under this contract, is an activity that may be conducted by the State Lead Contractor. During the course of tank closure, samples generally are taken to determine if a release from the tank system has occurred. Closure samples should be collected from media and locations most likely to indicate a release should a release have occurred. Soil samples typically are collected during tank closure. Most often, these samples are collected from beneath the tank, along product lines, and beneath dispensers. Soil samples may be collected from the side walls of an excavation if the water table is above the bottom of the tank. Soil samples collected as part of tank closure should not be collected from below the water table.

If a high water table exists at a site and ground water is present in the tank pit, the State Lead Contractor may collect a water sample from the tank excavation in lieu of collecting soil samples.

When a petroleum storage tank is closed and samples are collected, those samples will be analyzed for Total Petroleum Hydrocarbons by an EPA approved method or another method approved by DEQ. Closure samples collected from the vicinity of a gasoline-containing tank will be analyzed for TPH by EPA method 8015 for gasoline range organics. Closure samples collected from tanks containing middle distillates or residual fuel oils will be analyzed for TPH by EPA method 8015 for diesel range organics. Analytical results from the closure samples are then compared with the Storage Tank Program's reporting thresholds to determine if a release has occurred (see Appendix D for the release reporting thresholds).

The primary focus is on reviewing positive or detected data and the major question to be answered is if the release reporting level has been exceeded. Provided that the holding time has not been exceeded, nothing was detected in the lab blank, and the lab did not list the data as "unusable," DEQ generally will consider the result reported by the lab to be usable for determining if a release from the tank has occurred.

Few samples collected by the State Lead Contractors ultimately will be used in an enforcement action. Regardless of enforcement possibilities, chain-of-custody will be documented and maintained for all samples collected by State Lead Contractors and sent to a laboratory for analysis. See section 2.4.2 for chain-of-custody requirements.

2.2.2 Data Quality Needs – Samples Collected During Site Characterization

Site Characterization activities comprise a major portion of the work performed under the State Lead Program. Samples collected during Site Characterization must provide information about the severity and extent of the contamination and be used to support the Risk Assessment.

Soil and ground water samples usually are collected during Site Characterization. Sometimes, other types of samples such as indoor air or soil vapor samples may be collected. Sample analytical methods selected and compounds evaluated are based upon the type(s) of petroleum released at the site and the types of exposure pathways and risks that may be present. Tables 2-1 and 2-2 summarize the typical analytical methods used and analytes evaluated during Site Characterization. It is important to note that in all cases, the DEQ Case Manager and the State Lead Contractor will decide on a site-specific basis the data

collection needs during the Site Characterization phase of work.

Table 2-1 Analytical Matrix for Soil Samples Collected During Site Characterization			
Petroleum released at site	Soil Sample Analytical Method	Typical sample analytes	Typical Conditions for Analysis
Gasoline	EPA Method 8015B	TPH (GRO)	Most soil samples collected at a site during site characterization will be analyzed for TPH
	EPA Method 8021B or 8260B	BTEX	Soil samples will be analyzed for BTEX when potential risks warrant this information and when leaching potential to ground water needs to be evaluated.
	EPA Method 8260B	VOCs	Soil samples will be analyzed for volatile organics when potential risks to constituents warrant this information and to determine if materials other than petroleum were released at the site
Middle distillates and residual fuels	EPA Method 8015B	TPH (DRO)	Most soil samples collected at a site during site characterization will be analyzed for TPH
	EPA Method 8270C or 8100	PAHs	Soil samples will be analyzed for PAHs when potential risks to constituents warrant this information.
See Appendix D for sample preparation/extraction methods, reporting levels, sample containers, preservation and holding times			

Focal points during the Site Characterization phase include reviewing positive or detected data and supporting the Risk Assessment. Major questions at this stage of work often include: (1) Have any action limits been exceeded; and (2) Do risks posed by the release require corrective action? Provided that the sample holding time has not been exceeded, nothing was detected in the blank samples, and the lab did not list the data as “unusable,” DEQ generally will consider the results reported by the lab to be usable for the purpose of characterizing site conditions. Audits of laboratory QC information also will be performed periodically on Site Characterization data. For additional information about audits of lab QC information, see Section 4.2.1.6.

Table 2-2 Analytical Matrix for Ground Water and Surface Water Samples Collected During Site Characterization			
Petroleum released at site	Water Analytical Method	Typical sample analytes	Typical Conditions for Analysis
gasoline	EPA Method 8021B	BTEX and MTBE	Most ground water and surface water samples collected during site characterization will be analyzed for BTEX and MTBE
	EPA Method 8260B	VOCs	Ground water and surface water samples may be analyzed for a more complete set of VOCs if it is believed that materials other than petroleum may have been released. Typical target analytes are listed in Appendix E.
	EPA Method 8015C	TPH (GRO) and Ethanol if needed	Most ground water and surface water samples collected during site characterization will be analyzed for TPH. These samples also may be analyzed for ethanol if the contractor and DEQ Case Manager believe this information is needed.
	EPA Method 8011	EDB and 1,2-dibromo – 3-chloropropane	This method may be used to analyze ground water or surface water if leaded gasoline was or may have been released and risks to a nearby drinking water supply need to be evaluated
Middle Distillates and Residual Fuels	EPA Method 8100	PAHs	Ground water may be analyzed for these constituents when risks to a nearby drinking water supply need to be evaluated
	EPA Method 8270C	PAHs and/or SVOCs	Ground water may be analyzed for these constituents when risks to a nearby drinking water supply need to be evaluated. Typical target analytes are listed in Appendix E.
	EPA Method 8015C	TPH (DRO)	Most ground water samples collected during site characterization will be analyzed for TPH
	EPA Method 8021B	BTEX and MTBE	Ground water may be analyzed for these constituents when risks to a nearby drinking water supply need to be evaluated
	EPA Method 8260B	VOCs	Ground water samples may be analyzed for a more complete set of VOCs if it is believed that materials other than petroleum may have been released and/or risks to a nearby drinking water supply need to be evaluated. Typical target analytes are listed in Appendix E.
See Appendix D for sample preparation/extraction methods, reporting levels, sample containers, preservation and holding times			

Chain-of-custody will be documented and maintained for all samples collected by State Lead Contractors and sent to a laboratory for analysis. See Section 2.4.2 for chain-of-custody requirements.

2.2.3 Data Quality Needs - Drinking Water Samples

The majority of samples collected to determine if drinking water has been impacted by petroleum will be performed by the Carbon Filtration Unit (CFU) contractor in accordance with the Quality Assurance Project Plan for that contract. However, State Lead Contractors also may collect drinking water samples to evaluate impact to water supply systems. The DEQ Storage Tank Program has a no-tolerance practice for petroleum compounds in private drinking water supplies. If petroleum constituents are detected in private drinking water supplies, the operator is offered a point of use treatment system and DEQ will assist them with the establishment of a permanent alternate water supply. If petroleum constituents are detected in a public water supply in excess of Virginia's drinking water standards, the DEQ generally will assist the operator of that system as needed. The DEQ expects the State Lead Contractor to immediately notify the Regional Case Manager if any constituent is found above the method detection limit in a sample from a water supply. A list of target analytes and method reporting level requirements for water supply samples analyzed for volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) is included in Appendix E. Analytical Method requirements for water samples collected from a potable water supply well or system are contained in Appendix D.

The primary focus is on reviewing positive or detected data and the major question to be answered is if the constituent is present in the sample. Holding times, blank samples, and qualifiers all will be examined during the data validation process (see Chapter 4). Provided that the holding time has not been exceeded, nothing was detected in the blank samples, and the lab did not list the data as "unusable," DEQ generally will consider the result reported by the lab to be usable for determining if a water supply has been impacted by petroleum.

2.2.4 Data Quality Needs – Remediation System Effluent Samples

The State Lead Contractor often will install and operate remediation systems as part of this contract. Monitoring system effluent is a corrective action implementation activity that must be performed to evaluate system performance and ensure that effluent limits are being met. The Virginia Pollution Discharge Elimination System (VDPES) General Permit for Petroleum Contaminated Sites, Groundwater Remediation and Hydrostatic Tests specifies effluent limits for discharges of petroleum contaminated wastewater (see Appendix D for effluent limits). Effluent discharged to surface water under this permit must be monitored monthly and, if effluent limits for any constituent or parameter are exceeded, actions must be taken so that the discharge meets the effluent limits.

The primary focus is on reviewing positive or detected data and the major question to be answered is if the effluent limit for any parameter is exceeded. Holding times, blank samples, and qualifiers all will be examined during the data verification and validation process (see Chapter 4). Provided that the holding time has not been exceeded, nothing was detected in the blank samples, and the lab did not list the data as "unusable," DEQ generally will consider the result reported by the lab to be usable for determining if the effluent limits have been met.

2.2.5 Data Quality Requirements for and use of Secondary Data

Data generated by persons other than DEQ, the State Lead Contractor, the DEQ CFU contractor, and/or generated as part of investigations not performed to meet the requirements of the DEQ Storage Tank Program is considered secondary data. Most of the secondary data initially received by the DEQ is related to the presence of petroleum constituents in the environment. This data is evaluated by DEQ staff members who determine if additional information is needed and if the DEQ needs to direct the RP or a State Lead Contractor to further investigate the release.

When the DEQ Storage Tank Program receives or considers secondary data, the first step in the evaluation process is to determine if that data indicates that a release has or may have occurred. If the DEQ has no knowledge of petroleum contamination in an area, the secondary data first must indicate the existence of petroleum contamination. When evaluating the data, staff will consider information about the data and the source of that data including the:

- a. entity that generated the data;
- b. date(s)/timeframe(s) when data was generated;
- c. data type(s);
- d. format of data (report, lab analytical sheets, affidavit, statement from local official, etc.); and
- e. purpose of original report and data quality objectives (if known).

NOTE: Data generated by storage tank owners and operators related to meeting the requirements of the Storage Tank Program's laws and regulations are considered to be primary data.

2.2.5.1 Analytical Data

The major type of secondary analytical data that DEQ Storage Tank Program Staff encounter is generated as part of real estate transaction environmental site assessments. Occasionally, analytical data from other sources such as government studies or the sampling of municipal water supplies may be presented to DEQ.

Data quality objectives and quality controls for analytical data from these sources frequently are unknown. Virginia has no requirements for environmental site assessments related to real estate transfers and the DEQ has no input into these investigations before they are undertaken. The DEQ Storage Tank Program generally uses the analytical data from these sources to consider the presence or absence of petroleum constituents at a site and persons seldom provide this data to DEQ unless they find petroleum constituents or regulated substances in one or more of the samples they collected.

Except for samples collected as part of tank closure²⁻¹, tank owners/operators are required to report any detectable amounts of petroleum constituents or regulated substances in the environment to the Storage Tank Program. If petroleum constituents or regulated substances are present at a site, additional

²⁻¹ The reporting thresholds used for tank closure samples are 100 mg/kg TPH in soil samples, 1 mg/l in ground water samples, and any regulated substances exceeding the detection limit of the method used.

investigation at the site is warranted. The DEQ will require the tank owner/operator to perform this additional investigation. The presence of petroleum compounds at a site where the tank owner/operator is unknown, financially incapable, or unwilling to conduct corrective action may be accepted into the State Lead Program for additional evaluation. Once the DEQ directs a responsible person to undertake additional investigation or tasks one of our State Lead Contractors to perform this work, the analytical data generated as part of that investigation is considered primary data since it was generated specifically for the Storage Tank Program.

2.2.5.2 Historical Data (non-analytical data)

Historical data is another type of secondary data that may be used by the State Lead Program. This data may include, but is not limited to, tank owner's/operator's records, government records, and information provided by local government officials or persons residing at or near a site of interest. Much of this data is related to site history and use and tank ownership. Information about tank and land ownership is used in the process of determining the person responsible for a release from an UST or AST. The Storage Tank Program Technical Manual contains procedures for determining the person responsible for releases from USTs and ASTs including the documentation that is needed in order to make this responsible person determination.

Historical data about land use and site history may be used qualitatively to consider the types of materials that might have been used or handled at a site and the locations of activities or storage areas involving or containing these materials. This information may be used to further refine sampling and analytical work to be performed under the State Lead Program. If historical data presented to or obtained by DEQ staff indicate that a gasoline service station was present at a location prior to 1990 and water supplies are believed to be at risk of being impacted by petroleum from this site, staff will direct the State Lead Contractor to analyze any drinking water samples for 1,2 dibromoethane (a.k.a. ethylene dibromide) and 1,2 dibromo-3-chloropropane (DBCP) in addition to VOCs and SVOCs to determine if constituents from leaded gasoline are present in local water supplies.

2.2.5.3 Data from Computer Models and Publications

Contaminant fate and transport models may be used to characterize a release and estimate the fate of constituents introduced into the environment. The work performed to characterize a release in order to meet DEQ's regulatory and statutory requirements is considered primary data. Computer modeling is rarely performed as part of Environmental Site Assessments for real estate transactions and is seldom provided to DEQ in this type of a report.

2.2.5.4 Data from Maps, Photographs, and Geographic Information Systems

Data from maps, photographs, and geographic information systems (GIS) generally is used once a release has been discovered, reported, and the case is already being evaluated by the Storage Tank Program. This data primarily is used to initially evaluate the receptors that may be present near a release and may

warrant further investigation to determine if they have been impacted. This initial information provided by maps, photographs, county GIS, and similar sources is then investigated further by DEQ staff or the State Lead Contractor to determine the actual presence of potential receptors, collect names and addresses of persons and businesses, and obtain permission from these persons or businesses to gather additional information related to the release.

2.3 Training Requirements

The State Lead Program must have data of a sufficient and known quality in order for DEQ to protect human health and the environment. Obtaining data of such quality requires that the persons collecting the data use procedures that will ensure the integrity of that data. Persons collecting data for the State Lead Contractor must be familiar with and use established sample collection procedures in order to ensure that the data collected meet the Data Quality Objectives for the phase of work at a particular State Lead site.

2.3.1 Training Requirements - DEQ Regional Case Managers

Sample and data collection for the State Lead Program are performed by the State Lead Contractor. The Regional Case Manager's role in the Quality Assurance process is predominantly related to determining the data quality objectives for the site or the specific phase of work that will be performed for the site, determining the number and type(s) of samples and other data that are needed to meet the data quality objectives, evaluate the data received from the State Lead Contractor, and determine the future course of action for the site.

Given these responsibilities, Regional Case Managers must be familiar with current investigative and corrective action techniques. They must also understand their roles in the State Lead process and current Storage Tank Program procedures. Staff also must be familiar with the standard data collection procedures used by the State Lead Contractor and must be able to work with the State Lead Contractor to adjust procedures as needed to meet site specific data quality objectives.

2.3.2 Training Requirements - State Lead Contractor(s)

The State Lead Contractor is responsible for collecting the samples and other types of data at most State Lead sites. Samples and other field data collected for the State Lead Program must meet the data quality objectives specified by the Regional Case Manager. The Regional Case Manager and the Contractor are expected to discuss these objectives and determine the scope of work needed to meet these objectives. The DEQ expects the State Lead Contractor to have standard sample collection procedures and field personnel collecting samples and other data for the State Lead Contractor are expected to be familiar with these standard procedures. If the State Lead Contractor and the Regional Case Manager believe that the standard procedures should be modified for a particular site or phase of work at that site, the State Lead Contractor must ensure that persons collecting the data are aware of these changes.

Depending upon the scope of work, data collection at the site may involve the use of hand-held or

portable field instruments. Field personnel using these instruments are expected to be trained in their use and follow the manufacturer's instructions. The State Lead Contractor must provide DEQ with a list of field test equipment used on the State Lead Contract. Also, the State Lead Contractor must be able to provide the instructions for operating that equipment should this information be requested. Field equipment requiring calibration must be calibrated in accordance with instructions provided by the manufacturer.

During site visits, persons collecting data in the field are expected to record information about the site. They must be informed as to the types of information that must be recorded and the disposition of that information.

2.4 Documentation Requirements

2.4.1 Field Notes

During most site visits, the State Lead Contractor will be collecting data about the site. The person visiting the site is responsible for recording information about the site and any samples collected. This person is then expected to record information collected from the site in a bound field notebook. All entries will be recorded in indelible ink. Each page of field notes collected for a site must contain the pollution complaint number for the case and be initialed by the investigator and dated. Copies of all field notes must be placed in the appropriate case file in the State Lead Contractor's office.

2.4.2 Chain-of-Custody

Once a sample is collected, precautions must be taken to preserve the sample's chemical and physical integrity during transport to the lab and storage prior to analysis. The State Lead Contractor is responsible for documenting that the integrity of the samples has been maintained during transport to and storage at the lab.

The person collecting samples in the field is responsible for custody of those samples until those samples are placed in a cooler (or other appropriate shipping container) along with the necessary documentation and released directly to a courier or the laboratory. From this point forward, the laboratory is responsible for custody of the samples.

When the State Lead Contractor sends samples to a laboratory, the following procedures should be used to document custody of the sample:

1. A Chain-of-Custody form must be completed for all samples collected.
2. The Chain-of-Custody form must be signed by each individual who had possession of the samples.
3. If samples must be placed in multiple coolers, a separate Chain-of-Custody form must be used for the samples in each cooler.
4. If the samples will be sent to the lab via a courier (i.e., commercial carrier)
 - A. The original of the Chain-of-Custody form and one copy should be placed in a watertight

- plastic bag inside the cooler (or other appropriate shipping container). It is recommended that this plastic bag then be taped to the lid or top of the shipping container.
- B. One copy of the Chain-of-Custody form must be retained by the person collecting the samples and subsequently, placed in the appropriate case file.
 - C. The waybill will serve as an extension of the Chain-of-Custody record between the final field custodian and receipt of the sample(s) in the lab.
 - D. The sender's copy of the waybill should be stapled to and placed in the appropriate case file with the sampler's copy of the Chain-of-Custody form.
 - E. The waybill tracking number should be entered on the Chain-of-Custody form and in the field log book.
5. If the samples are transported directly to the lab by the State Lead Contractor:
- A. When samples are transported directly to the lab by the person who collected the samples, that person should initial the "Relinquished by" block on the form upon arrival at the lab.
 - B. The person at the lab receiving the samples should then initial the "received by" block on the Chain-of-Custody form.
 - C. When the samples are transported to the lab by someone other than the person collecting the samples, the person who collected the samples must initial the "relinquished by" block on the form and the person who will transport the samples to the lab must initial the "received by" block.
 - D. Upon arrival at the lab, the person transporting the sample(s) will initial the second "relinquished by" block on the Chain-of-Custody form and the person at the lab will initial the second "received by" block on the form.

NOTE: DEQ staff do not routinely collect analytical data at state lead sites. Staff collecting data at a State Lead site should follow the chain-of-custody guidelines listed in the Quality Assurance Project Plan for the AWS Program.

2.4.3 Analytical Results

Analytical results for samples collected by the State Lead Contractor will be provided to the DEQ Regional Case Manager in the report or other written deliverable document for that particular phase of work. Analytical results provided to DEQ must be submitted on laboratory letterhead and signed by a person responsible for analyses performed by the lab. The analytical sheet(s) must also list the method used, detection limits, sample dilution (if applicable), laboratory comments and code (if applicable), the date on which the sample was collected, the date that the sample was extracted (if applicable), and the date on which the sample was analyzed.

2.4.4 Conversation Logs and Site Photographs

During the course of performing work related to the State Lead contract, State Lead Contractors may deal with third parties. The contractors also may take photographs of the site. The State Lead contract requires the State Lead Contractor to include records of conversations they have with third parties about state lead sites and photographs taken of state lead sites in the pertinent report for the phase of work. The

contractor must maintain copies of these photos and conversation logs in their case file and include these logs and photos in the pertinent report.

3.0 DATA ACQUISITION

3.1 Sample Collection Process

The State Lead Contractor, as a condition of the State Lead Contract, is required to provide DEQ with standard sample collection procedures that are used by their personnel. The State Lead Contractor must use standard sample collection procedures and equipment as specified in Appendix D for monitored parameters when appropriate

The DEQ recognizes that site specific conditions may make it necessary for standard sample collection procedures to be modified in order to meet the data quality objectives for a particular phase of work. When sample collection procedures need to be modified, the State Lead Contractor and the Regional Case Manager need to determine and agree upon the procedures that will be used to meet the data quality objectives. Once the work is performed, the State Lead Contractor should include a description of the sampling procedures used for that phase of work in the appropriate report or other deliverable document as agreed to by the Regional Case Manager and the State Lead Contractor.

3.2 Sample Handling Requirements

Proper sample handling is necessary to minimize accidents and ensure sample integrity. All samples should be preserved in accordance with the requirements for the analytical method used. Samples collected for the State Lead Program will be labeled immediately after collection, wrapped in a plastic sleeve or other protective covering to prevent breakage of the sample container, and placed on ice. The samples then will be delivered or shipped to a laboratory for analysis.

3.3 Analytical Method Requirements

Samples collected by the State Lead Contractor and sent to a laboratory will be analyzed in accordance with EPA or DEQ Storage Tank Program approved analytical methods. Field test kits may be used as deemed appropriate by the State Lead Contractor and the Regional Case Manager. In most instances, it is expected that field test kits will be used for screening purposes such as segregating soil to determine what needs to be disposed.

3.4 Quality Control Requirements

Quality control refers to the series of procedures and activities that are performed to ensure that the data collected meet the established standards. Within the context of the State Lead Program, the primary purpose of quality control is to ensure that the sampling and analytical protocols are properly executed and that errors in the data set are recognized and corrected before DEQ staff make a decision using erroneous data or data that are of insufficient quality to support the required decision.

3.4.1 Blanks

Rinsate blanks are a type of quality control sample used to evaluate the effectiveness of sample equipment decontamination. Rinsate blanks are obtained by running deionized water through all the cleaned surfaces of the sampling equipment that the sample water contacts during the sample collection process. Once collected, rinsate blanks are labeled, placed in the cooler along with the other samples, and sent to the lab for analysis. The method(s) used for analyzing rinsate blanks should match the method(s) used to analyze other water samples during that particular phase of work. Rinsate blanks do not need to be analyzed if the constituents of concern in all other water samples collected and analyzed from that trip are below the detection limits.

The DEQ Storage Tank Program has a no tolerance practice for petroleum constituents in private drinking water supplies. It is imperative, therefore, that our staff have a high degree of confidence that any constituents found in a drinking water sample are from the water supply and not from a contaminated sample collection device. Drinking water samples collected by State Lead Contractors usually are collected from a household faucet or spigot and go directly into the sample container without the use of any sampling devices. If a sample collection device is utilized to collect drinking water samples, one rinsate blank must be collected along with each drinking water sample. Rinsate blanks do not need to be analyzed if the constituents of concern in all other drinking water samples collected and analyzed from that trip are below the detection limits.

Ground water samples usually are collected by devices and equipment including bailers, tubing, and pumps. Checks are needed to evaluate the effectiveness of decontamination of the devices and equipment that come into contact with the sample being collected. One rinsate blank should be collected per site visit whenever ground water samples are collected. Rinsate blanks should be analyzed for the same constituents and by the same methods as the ground water samples collected during that particular site visit.

Trip blanks are quality control samples consisting of reagent grade deionized water placed in the appropriate sample containers and preserved in accordance with the method requirements. These blanks usually are prepared by the laboratory prior to sample collection activities. The purpose of trip blanks is to determine if the sample container, preservative, or transportation process may be introducing contaminants into the samples. These blanks, when used, are placed in the cooler when the State Lead Contractor leaves their office, taken into the field, and subsequently analyzed in the lab along with the samples collected in the field. Trip blanks are analyzed for the same parameters or constituents as the other samples. Trip blanks do not need to be analyzed if the constituents of concern in all other samples collected and analyzed from that trip are below the detection limits.

Trip blanks must be used when the State Lead Contractor will collect samples from drinking water supplies. Drinking water samples usually are analyzed for VOCs and SVOCs by EPA methods 8260 and 8270, respectively. One VOC trip blank and one SVOC trip blank must be placed in each sample cooler that will be used to store and transport drinking water samples.

It has been the experience of DEQ staff that if contaminants are introduced into samples via the sample container, preservative, or transportation processes, those contaminants are present at very low concentrations (i.e. typically low parts per billion levels. Most decision thresholds for constituents in

ground water are at concentrations that are orders of magnitude higher than what is typically observed due to cross contamination. Trip blanks generally are not considered necessary by this program are not routinely included with ground water samples. The Regional Case Manager and the State Lead Contractor may include trip blanks along with ground water samples if they believe the data quality needs for a particular phase of work at a particular site warrant this additional information.

Another type of quality control sample that the State Lead Contractor might collect is a field blank. Field blanks are prepared in the field where water samples will be taken by pouring deionized water into the appropriate sample container(s). The purpose of collecting field blanks is to determine if ambient conditions at the site (i.e. automobile exhaust, dust, precipitation, etc.) may bias sample results. Field blanks, when collected, typically are analyzed only for volatile organic constituents as these are much more likely than SVOCs to present a risk of sample cross contamination. State Lead Contractors collecting samples from water supply systems should collect one field blank per site (e.g. residence).

It has been the experience of DEQ staff that if contaminants are introduced into ground water samples via ambient site conditions, those contaminant are present at very low concentrations (i.e. typically low parts per billion levels). Most decision thresholds for constituents in ground water are at concentrations that are orders of magnitude higher than what is typically observed due to cross contamination via ambient site conditions. Storage Tank Program staff generally consider the collection of field blanks to accompany ground water samples to be unnecessary. The Regional Case Manager and the State Lead Contractor may use field blanks if they believe the data quality needs for a particular phase of work at a particular site warrant this additional information.

Laboratories also are expected to use blanks to check data quality. After performing the calibration standards, laboratory personnel are expected to run a method blank every twelve hours. The method blank must be performed on each system that is used to analyze samples by that particular method (i.e. if two GC/MS systems will be used, then a method blank must be run on each system).

The analysis of heavily contaminated samples potentially creates problems with the cross contamination of subsequent samples analyzed by the same equipment. An instrument blank should be analyzed after any grossly contaminated sample is analyzed to demonstrate that the analytical equipment has been decontaminated.

3.4.2 Duplicate Samples

Another type of quality control sample that may be utilized in the State Lead Program is the duplicate sample. Duplicate samples are samples collected from the same location (e.g. monitoring well, drinking water supply) using the same device(s) and as close to the same time as possible and analyzed for the same constituents using the same analytical methods. Duplicate samples generally are labeled so that the laboratory will not know that the samples are duplicates. The purpose of duplicate samples is to check method precision. The Regional Case Manager and State Lead Contractor will determine on a case-by-case basis the need for duplicate samples.

NOTE: Due to their inherent heterogeneity, duplicate soil samples will not be collected unless this action is deemed necessary by the Regional Case Manager and the State Lead Contractor.

3.4.3 Laboratory Quality Control Procedures

Samples collected by the State Lead Contractor will be sent to a private lab for analysis. Starting on January 1, 2012, all private labs used by State Lead Contractors must be accredited and meet the Virginia Environmental Laboratory Accreditation (VELAP) standards. The Storage Tank Program expects these samples to be analyzed by EPA methods or methods approved by the DEQ Storage Tank Program. The analytical methods to be used for a particular phase of work should be specified and pre-approved on the AAF prior to sample collection at the site. Laboratories analyzing samples for the Storage Tank Program must meet the Quality Control requirements specified and/or recommended for the analytical method.

3.5 Data and Document Management

Storage Tank Program staff in both the Regional Offices and OSRR and the State Lead Contractor all contribute to the base of information collected for a State Lead site and all of these entities, either directly or indirectly are involved in the decisions that are made about the site. A key component of the decision making process is the availability of information. Data and document management consists of the systematic storage and retrieval of information related to the State Lead Program.

3.5.1 Data Management

When a report of a release is received, the regional staff will assign a pollution complaint number (PC#) to the case and establish a file specifically for information related to that case. The Regional Storage Tank Program Manager will then assign the case to one of the Regional Case Managers who will investigate the release and obtain additional site information such as site location, the source(s) of the contamination, and tank owner's name, address, and phone number. If a tank owner or operator is found, the Regional Case Manager will direct the tank owner or operator as the responsible person to characterize and clean-up the release as necessary. If a RP is not found, the site may be considered for the State Lead Program.

All data and reports related to investigating, characterizing, and cleaning up a site is placed in the case file for that site in the regional office. The Regional Case Manager is responsible for reviewing, approving, and processing State Lead AAFs submitted by the State Lead Contractor.

When the scope of work for a particular phase or activity has been completed, the State Lead Contractor will submit a completed State Lead AAF to the Regional Case Manager for verification. The Regional Case Manager will verify the work performed and provide this verified AAF to the DEQ Accounting Office. The State Lead Accounting Officer then will review State Lead invoices received and compare those invoices with the approved AAFs.

3.5.2 Document Management

Documents generated as part of the State Lead Program may include, but are not limited to, Initial

Abatement Reports, Site Characterization Reports, Corrective Action Plans, periodic monitoring reports, and requests to initiate corrective actions under Interim Authorization. Although analytical data sheets, field notes, and other information collected for a site may be submitted to the DEQ upon request, DEQ expects that this information will usually be contained in a report summarizing the particular scope of work that was completed at the site.

Field notes for most State Lead sites usually will be recorded by either the DEQ regional staff or the State Lead Contractor. Copies of field notes taken by regional staff must be placed in the pertinent case file at the Regional Office. Copies of field notes recorded by the State Lead Contractor will be placed in the pertinent state lead case file at that contractor's office and included in the subsequent report submitted to DEQ for that scope of work or included with other documents as specified by the DEQ Case Manager.

State lead cases are a subset of petroleum/oil discharge-related pollution complaints. Reports, field notes, and almost all other information related to a particular state lead case are retained in the pollution complaint file housed in the DEQ regional office. Correspondence, analytical results, and all data related to the maintenance of carbon filtration units (CFUs) at all sites, state lead or RP lead, are housed in the Office of Spill Response and Remediation in accordance with the Quality Assurance Project Plan for the CFU Program. Contract documentation related to the extension of public water supplies or development of community water supplies at State Lead sites is maintained in the Major AWS Contract files in the Office of Spill Response and Remediation.

The document retention schedule governing the Storage Tank Program's pollution complaint files is Records Retention and Disposition Schedule number 440-011-009590 and is dated April 10, 2010. The approved document retention and disposition schedule states that DEQ will retain these records for 50 years after case closure then destroy the contents of the file.

3.5.2.1 Document Management - DEQ Regional Offices

The DEQ Regional Offices maintain the files of record for all pollution complaints resulting from leaking storage tanks. All information related to release investigation, release response, and/or corrective action for individual State Lead sites is maintained in the Regional Offices.

3.5.2.2 Document Management - OSRR

The files of record for individual State Lead cases are maintained in the Regional Offices. The State Lead Program Manager in OSRR will maintain files related to the State Lead Contract and budget. Information for State Lead cases involving the extension of a public water supply line or other type of major alternate water supply project managed by OSRR staff will be maintained by the State Lead Program Manager.

3.5.2.3 Document Management - State Lead Contractor(s)

Documents managed by the State Lead Contractor include field notes taken during site visits, laboratory

analytical sheets, chain of custody records, and records related to the calibration and maintenance of equipment used to analyze samples. The State Lead Contractor is expected to maintain individual case files for each State Lead case. Field notes, laboratory analytical sheets, chain-of-custody records, site photographs, conversation logs with third parties, and other site-specific information must be placed in the appropriate case file. The State Lead Contractor must include copies of analytical sheets, chain-of-custody records, and field notes in reports submitted for that particular phase of work. The Regional Case Manager also may request equipment calibration and maintenance records and records related to staff training in company-specific standard sample collection procedures.

3.6 Instrument/Equipment Testing, Inspection, Calibration, and Maintenance

The quality of data collected from a site is dependent upon the instruments and other types of equipment that are used to collect the data. DEQ staff, the State Lead Contractor, and laboratories may use instruments that will collect or analyze data for a site. In all cases, instruments and equipment must be inspected, calibrated, and maintained to ensure the integrity of the data provided.

3.6.1 Instruments and Equipment used by the State Lead Contractor

The State Lead Contractor routinely analyzes samples in the field using instrument and/or field test kits. Field instruments that may be used by the State Lead Contractor when characterizing or cleaning up a site may include, but are not limited to, portable flame and photo-ionization detectors, interface probes and/or water level indicators, and instruments for determining standard water quality parameters including pH, conductivity, and temperature.

Standard operating procedures for individual instruments and field test kits vary depending upon the kit or instrument used. Unless the Regional Case Manager and the State Lead Contractor decide that the manufacturer's procedures are not appropriate for a particular phase of work, the State Lead Contractor will use the standard operating procedure that is provided by the manufacturer of the instrument. If the Regional Case Manager and the State Lead Contractor decide that the manufacturer's standard operating instructions are not appropriate for a particular activity or phase of work, the Regional Case Manager must ensure that this decision is documented in the case file

Instruments must be calibrated and maintained in accordance with the manufacturer's instructions. Persons collecting data in the field must specify the date that the instrument was last calibrated in the field notes. Manufacturer-specific procedures used by the State Lead Contractors for documenting the appropriate maintenance, inspection, and calibration of field instruments are kept on file and maintained by the State Lead Contractor. .

Depending upon the scope of work for the site, the State Lead Contractor also may use various field test kits with prior approval from the Regional Case Manager. Samples analyzed by a test kit should be analyzed in accordance with the manufacturer's instructions. Persons collecting samples must be aware that reagents provided in certain test kits may have a listed shelf life. When a test kit is used in the field,

the person analyzing the sample must record the type of test kit used and the expiration date for the test kit and/or reagents used in the field notebook. Results from test kits that are obtained after the expiration date for the test kit or reagents in the test kit will not be accepted by DEQ.

3.6.2 Instruments and Equipment used by Laboratories

Analytical results for samples collected by the State Lead Contractor or DEQ staff are critical components in the decision making process at most state lead sites. Calibration of equipment used by private laboratories must be performed in accordance with the QA/QC requirements for the analytical method(s) used to analyze the samples. Starting on January 1, 2012, all private labs used to analyze samples for the State Lead program must meet VELAP requirements. Equipment calibration at the Division of Consolidated Laboratory Services (DCLS) will be performed in accordance with the DCLS QA/QC procedures manual. Maintenance of equipment used to perform analyses will be performed in accordance with the manufacturer's instructions. The Regional Case Manager may require the State Lead Contractor to provide QA/QC procedures for commercial laboratories used by that contractor.

4.0 PROJECT ASSESSMENT AND CORRECTIVE MEASURES

The process of developing technical procedures for the DEQ Storage Tank Program, either in part or as a whole, is carried out by Storage Tank Program staff and managers within both the regional offices and OSRR. Reviews and assessments of the QA/QC components of the State Lead Program also will be conducted by a group of persons from the Storage Tank Program. In order to obtain input from an individual who is outside of the program, the Storage Tank Program will usually request that the DEQ WQM Quality Assurance Officer assist with reviews and assessments of QA/QC procedures.

When assessments identify procedural changes in the program or quality assurance elements that need to be modified, corrective measures will be developed and implemented. The Quality Assurance Manager for the Storage Tank Program is responsible for coordinating the development of corrective measures. The State Lead Program Manager, selected persons from OSRR, and a group of Regional Case Managers will assist with developing corrective actions to address the problems identified.

4.1 Management System Review

A management system review is an evaluation of an organization's management practices as they relate to quality assurance. Management system reviews will be performed on the State Lead component of the Storage Tank Program to evaluate the effectiveness of existing management procedures designed to assure data quality, the adequacy of resources and personnel devoted to quality assurance functions, the effectiveness of training and assessments, and the applicability of data quality requirements. Management system reviews will also identify areas where quality assurance improvement is needed and areas where noteworthy accomplishments have been made within the program.

The Quality Assurance Manager for the DEQ Storage Tank Program is responsible for coordinating Management System Reviews. The State Lead Program Manager, Regional Case Managers from the Regional Offices, and OSRR Management will also participate in evaluating management systems within the AWS Program. The Management System Reviews will examine the following elements of the State Lead Program:

1. The overall effectiveness of the quality management system within the State Lead Program;
2. Procedures, criteria, and schedules for conducting audits related to quality assurance within the State Lead Program;
3. Responsibilities and authorities of DEQ managers and staff for implementing the Quality Assurance Project Plan for the State Lead Program;
4. The level of resources committed to implementing the quality assurance component of the State Lead Program;
5. Procedural changes that may affect quality assurance within the program; and
6. Corrective actions taken to address deficiencies in QA/QC within the State Lead Program.

The schedule for conducting Management System Reviews of the State Lead Program will be based upon time and changes within the program. The interval between Management System Reviews is expected to be approximately one year. Management System Reviews will also be performed when major State Lead procedures are changed.

4.2 Data Quality Assessment

Decisions made within the State Lead Program are highly dependent upon analytical data for samples that are collected by the State Lead Contractor or DEQ staff. Data must, therefore, be of sufficient and known quality to support decisions made by the DEQ Storage Tank Program Staff.

Data quality assessments will be performed to evaluate data collected for the State Lead Program to ensure that the data collected meet the Data Quality Objectives of the Program and ensure that corrective actions are taken if data quality is insufficient. The primary elements of assessing data quality within the State Lead Program will be data validation and data quality audits.

4.2.1 Data Verification, Validation, and Corrective Action

Analytical data returned to the State Lead Contractor or DEQ staff from the laboratory must be validated and verified to ensure that the data are of sufficient quality to support the decisions that must be made about the site. The State Lead Contractor will review lab sheets, field notes, and other data-related documentation to verify the completeness of the data contained within those documents. The State Lead Contractor also is expected to perform the first check of data validation to ensure that proper methods and procedures were used to collect and analyze the samples.

When a report having analytical data is submitted to DEQ, the Regional Case Manager will review the report. Part of the review will include verifying that the field documents and lab report forms are complete. The Case Manager also will validate the data to ensure that the proper analytical methods were used.

The State Lead Program Manager periodically will audit reports submitted for State Lead sites as a check for data validation and verification performed by the State Lead Contractors and Regional Case Managers.

DEQ Storage Tank Program staff collect few environmental samples and are unlikely to collect samples as part of the State Lead Program. Data quality verification and validation for samples collected by DEQ staff will be performed by the DEQ Regional Case Manager or State Lead Program Manager and undergo the same validation procedures as the samples collected by the State Lead Contractor.

NOTE: Ideally, data validation should be performed by a third party. At the present time, DEQ does not have the staffing resources to assign data validation to individuals within other sections of the DEQ.

4.2.1.1 Holding Time

Holding time is an important element that must be considered when evaluating the quality of data. Persons checking information provided by the lab must review the sample collection date and sample analysis date to ensure that the holding time for the requested analysis was not exceeded. If the holding time was exceeded, DEQ will consider the analytical result received and the type of decision that must be supported by the data. Table 4-1 contains a matrix of some of the types of samples that may be collected by the State Lead Contractor and actions that should be taken if holding times are exceeded.

When a holding time is exceeded, it is important to determine why the holding time was exceeded in order to prevent or reduce the probability of a repeat occurrence. The Regional Case Manager and the person who collected the sample (usually the State Lead Contractor) will review the sampling process used to determine why the holding time was exceeded. If the exceedance was attributed to the laboratory or to a site specific sample collection and handling procedure, the Regional Case Manager should document this conclusion in the appropriate case file. If the review indicates that standard sample collection procedures used by the State Lead Contractor and/or DEQ staff are causing holding times to be exceeded, the Regional Case Manager must notify the Storage Tank Program Quality Assurance Manager. The Quality Assurance Manager, Regional Case Manager, the State Lead Program Manager, and the State Lead Contractor will revise the sampling procedure as needed to meet the holding times for the samples.

4.2.1.2 Analysis of Blanks

Blanks collected by the State Lead Contractor and subsequently analyzed by a lab may include rinsate or equipment blanks, field blanks, and trip blanks. Analytical data for all blanks submitted to a laboratory will be reviewed by the State Lead Contractor. The DEQ Case Manager also will review data for blanks when reading the phase report submitted for the site. The presence of petroleum constituents or other organic analytes in a blank suggests that sample integrity may be compromised. If any analytes are detected in blank samples, the State Lead Contractor must bring this to the attention of the Regional Case Manager. The Regional Case Manager and the State Lead Contractor then will evaluate the situation considering the data quality objectives for the samples and determine the appropriate course of action and the necessary corrective measures. Table 4-2 contains a matrix of recommended actions should organic constituents be found in blank samples.

Table 4-1. Decision Matrix for Samples that Exceed the Holding Time		
Purpose of Sample Collection	Result	Action
Samples collected to determine if private water supply well is impacted	A holding time is exceeded and the concentration of any petroleum constituent > method detection limit.	The sample result usually will be interpreted by DEQ as indicating the presence of petroleum in the well and DEQ will begin the AWS process. The Regional Case Manager and the State Lead Program Manager have the authority to decide if another sample is needed.
	A holding time is exceeded and the concentrations of all petroleum constituents are below the method detection limits.	An additional sample must be collected and analyzed.
Samples collected to determine if public water supply well is impacted	A holding time is exceeded and the concentration of any petroleum constituent is above the Virginia drinking water standards or a health advisory issued by the Health Department.	DEQ will begin the AWS process. The Regional Case Manager and the State Lead Program Manager have the authority to decide if another sample is needed.
	A holding time is exceeded and the concentrations of all petroleum constituents are below the method detection limits.	An additional sample must be collected and analyzed.
Samples collected to determine if a release has occurred	A holding time is exceeded and the concentration of any petroleum constituent exceeds the release reporting threshold.	A release is confirmed and the release response and corrective action process will be initiated.
	A holding time is exceeded and the concentrations of all petroleum constituents are below the pertinent release reporting thresholds.	An additional sample must be collected and analyzed
Samples collected during Site Characterization	A holding time is exceeded	The Case Manager and the State Lead Contractor will decide if additional samples are needed.
Samples collected to monitor remediation system effluent	The holding time is exceeded and analytical results for any parameter exceed the effluent limit for that constituent.	Take action to reduce effluent limits to meet effluent standards.
	The holding time is exceeded and analytical results are below effluent limits	Another sample must be collected and analyzed.
Samples collected for system design and operation and maintenance:	A holding time is exceeded and the concentration of any petroleum constituent > method detection limit and the analytical result is within one order of magnitude of the previous analytical result for that parameter.	The Case Manager and the State Lead Contractor will decide if an additional samples are needed.
	A holding time is exceeded and the concentration of all petroleum constituents are below the method detection limits.	An additional sample must be collected and analyzed.

Laboratories also are expected to use blanks to check data quality. After performing the calibration standards, laboratory personnel are expected to run a method blank in accordance with the method requirements or recommendations (i.e. a frequency of 5% for SW846 8000 series methods). The method blank must be performed on each system that is used to analyze samples by that particular method (i.e. if two GC/MS systems will be used, then a method blank must be run on each system).

The analysis of heavily contaminated samples potentially creates problems with the cross contamination

of subsequent samples analyzed by the same equipment. The laboratory performing analysis must analyze an instrument blank should following the analysis of any grossly contaminated sample to demonstrate that the analytical equipment has been decontaminated.

4.2.1.3 Qualified Data

Analytical data sheets provided by the lab should qualify and provide additional information about the data presented on the sheet. DEQ staff and the State Lead Contractor should check the qualifiers to ensure that the data returned by the lab will support the decisions that must be made during the particular phase of work at the site.

Certain types of qualified data may not be able to support the decisions that DEQ must make at a site. Common qualifiers that staff and the State Lead Contractor may encounter are listed in Table 4-3 along with the actions that the State Lead Contractor and Case Manager usually will take when encountering these qualifiers. Corrective actions needed when these qualifiers are encountered must be determined by the Regional Case Manager and the State Lead Contractor and will be based upon the data quality requirements for that data.

4.2.1.4 Action Level Notification

The DEQ Storage Tank Program has release reporting levels. This program also has a no tolerance practice for petroleum constituents in private drinking water supplies. Appendix D contains a set of analytical method requirement matrices and these matrices include pertinent reporting levels. The DEQ expects the State Lead Contractors to report exceedances of the reporting levels to the Case Manager as soon as the exceedance is found.

4.2.1.5 Sample Paperwork

During the data validation process, the State Lead Contractor is expected to review the chain-of-custody form that was filled out for the samples and verify that the form was filled out correctly. The State Lead contractor should, at a minimum, ensure that the chain-of-custody form contains the following:

1. Signature(s) of person(s) collecting the samples.
2. Time and date of sample collection.
3. Signature of the lab's sample custodian.
4. All samples have a unique identification number or code.

Table 4-2. Decision Matrix for the presence of organic compounds in blank samples (water only)		
Purpose of Sample Collection	Result	Action ¹
Samples collected to determine if private water supply well is impacted	Any petroleum constituent, VOC, or SVOC is detected in a field, rinsate, trip blank, or lab blank and the constituent also is detected in the water supply sample.	The data cannot support decisions that must be made regarding alternate water supplies at that site and an additional water sample from that location must be collected and analyzed.
Samples collected to determine if public water supply well is impacted	Any petroleum constituent, VOC, or SVOC is detected in field, rinsate, trip, or lab blank and the reported concentration of that compound in the water supply sample exceeds Virginia's drinking water standard.	The data cannot support decisions that must be made regarding alternate water supplies at that site and an additional water sample from that location must be collected and analyzed.
	A petroleum constituent, VOC, or SVOC is detected in the field, rinsate, trip, or lab blank and the concentration of that constituent in the water supply sample is below the Virginia drinking water standard for that constituent	Sample integrity may be compromised, however, the data suggest that the concentrations of organic constituents in the water do not exceed the drinking water standards. The Case Manager and the State Lead Contractor will decide if another sample from that location is needed.
Samples collected for tank closure to determine if a release has occurred (water samples only) ²	A petroleum constituent is found in the lab blank and the concentration of that constituent in the closure sample(s) exceeds the release reporting threshold.	The data cannot support decisions that must be made regarding alternate water supplies at that site and an additional water sample from that location must be collected and analyzed
	A petroleum constituent is found in a lab blank, but the concentration of the constituent in the closure sample(s) is below the pertinent release reporting thresholds.	Sample integrity may be compromised. The Case Manager and the State Lead Contractor will decide if another sample from that location is needed
Samples collected during Site Characterization	A constituent is found in a rinsate, field, trip, or lab blank.	The Case Manager and the State Lead Contractor will decide if additional samples are needed ³ .
Samples collected to monitor remediation system effluent (water)	A constituent is found in the lab blank and analytical results for that that constituent in the effluent sample are below effluent limit.	The analytical results generally will be accepted unless the Case Manager and the State Lead Contractor decide an additional sample is needed.
	A constituent is found in the lab blank and the analytical results for that constituent in the effluent sample exceed the effluent limit.	Another sample must be collected and analyzed.
¹ In all instances where volatile organic constituents are found in a blank, the State Lead Case Manager and the State Lead Contractor must, to the extent possible, determine why one or more VOCs were found in a blank and take actions to prevent a future occurrence. ² Blanks generally will not be collected or used during tank closure unless the Case Manager and the State Lead Contractor believe this information is needed. ³ Many labs consider a blank sample to be acceptable as long as any analyte found in that blank is less than three times the method detection limit. Most samples collected for site characterization purposes can be used as long as the analyte is less than three times the method detection limit, however, DEQ staff and the State Lead contractor should determine why the analyte was detected in the blank and try to prevent a recurrence.		

Table 4-3. Data Qualifiers and Typical Corrective Actions		
Qualifier	Description	Action
J	The analyte was positively identified but the quantification is an estimation	In most instances, no action will be needed. If an analyte is found, but below quantification limits in a water supply sample, the Case Manager and State Lead Contractor should discuss this with the AWS Program Manager to determine if another sample should be collected.
U	The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection limit	No action needed.
R	The data are unusable due to deficiencies in the ability to analyze the sample and meet QC criteria	The sample data is unusable. Another sample must be collected unless the Case Manager and State Lead Contractor believe the information from this sample and location is not needed for the decision making process during this particular phase of work.
B	The analyte was found in associated blank, as well as in the sample	See Table 4-2.

4.2.1.6 Review of Laboratory QC Data

Laboratories are expected to follow the QA/QC requirements for the analytical method(s) used to analyze the samples. Some of the types of QC tools used to evaluate method performance include matrix spikes and matrix spike duplicates, method blanks, surrogate recovery data, and initial calibration data. The DEQ does not expect the State Lead Contractor to review the laboratory QC data for each set of samples. The DEQ State Lead Contractor should request that the lab provide QC information for all samples that were collected during the Site Characterization Phase. The State Lead Contractor will randomly audit laboratory QC data for sets of samples submitted during the Site Characterization Phase. It is recommended that the State Lead Contractor randomly check the lab QC data for approximately one out of every five sets of samples submitted during the Site Characterization phase. The DEQ Case Manager and the State Lead Contractor may check lab QC data for any set of samples if they believe that the data quality needs warrant this action.

Matrix spikes and matrix spike duplicates are tools that are used to evaluate the precision and accuracy of the analytical method on various matrices and to demonstrate acceptable recovery by the lab at the time of sample analysis (EPA 1994). Matrix spike and matrix spike duplicate samples must be analyzed at a frequency of one per 20 samples of the same matrix. According to EPA (1996), the recoveries of most compounds spiked into samples should be between 70 – 130 percent. The relative percent difference between the matrix spike recovery and the matrix spike duplicate must be within the limits listed in Table 4-4.

Accuracy is estimated from the recovery of spiked analytes from the matrix of interest (EPA 1996). Laboratory performance is estimated from the recovery of spiked analytes in the matrix spike sample. Matrix spike recovery percent is calculated using equation (1) below.

$$(1) \quad \% \text{ recovery} = \frac{C_s - C_u}{C_n} \times 100$$

Where:

C_s = the measured concentration of the spiked sample aliquot
 C_u = the measured concentration of the unspiked sample aliquot
 C_n = the theoretical concentration increase that results from spiking the sample

Precision is estimated from the relative percent difference (RPD) of the concentrations measured for matrix spike and matrix spike duplicate pairs. The RPD is calculated using equation (2) below.

$$(2) \quad \text{RPD} = \frac{(C_1 - C_2)}{[(C_1 + C_2)/2]} \times 100$$

Where

C_1 = Measured concentration of the first sample aliquot
 C_2 = Measured concentration of the second sample aliquot

Table 4-4. Matrix Spike and Matrix Spike Recovery and Relative Percent Difference Requirements		
Compound	RPD – water matrix	RPD – soil matrix
1,1-dichloroethene	≤ 14	≤ 22
Trichloroethene	≤ 14	≤ 24
Benzene	≤ 11	≤ 21
Toluene	≤ 13	≤ 21
chlorobenzene	≤ 13	≤ 21
These recommended relative percent difference values are from EPA (1994).		

Laboratories are expected to use method blanks to check data quality. After lab personnel perform the calibration standards, SW846 recommends that method blanks be prepared at a frequency of at least 5% (i.e. one method blank per 20 samples prepared at the same time and by the same procedures) for 8000 series methods. Lab personnel must analyze a method blank on each system that is used to analyze samples by that particular method (i.e. if two GC/MS systems will be used, then a method blank must be run on each GC/MS system). The analytical results from the method blank sample should be less than the lab's required reporting limit for that method.

Surrogates, also known as system monitoring compounds, are added to all samples prior to sample purging so that the lab may monitor analytical performance (some of the more common surrogate compounds are listed in Table 4-5). Laboratories are expected to evaluate surrogate recovery data from

individual samples versus the recovery limits developed by the lab. Surrogate recovery is calculated using equation (3) below.

$$(3) \quad \text{Recovery (\%)} = \frac{\text{Concentration or amount of surrogate compound found}}{\text{Concentration or amount of surrogate compound added}} \times 100$$

Labs are expected to develop surrogate recovery limits in accordance with the analytical method requirements or recommendations.

Initial and continuing calibration of instruments also are required as a way of demonstrating that the equipment is capable of producing acceptable data for the constituents of interest. As part of the lab QC data audit, the State Lead Contractor will check the lab's documentation to ensure that initial and continuing calibration were performed.

DEQ staff and/or the State Lead Contractor also may request and review other lab QC data such as retention time, chromatograms and mass spectra as they believe necessary to meet the needs of the individual state lead project.

Table 4-5 Common Surrogate Compounds	
Compound	Compound Class
4-bromofluorobenzene	Volatile Organics
1,2-dichloroethane	Volatile Organics
Toluene	Volatile Organics
Nitrobenzene	Semi-volatile Organics
Fluorobiphenyl	Semi-volatile Organics
Terphenyl	Semi-volatile Organics
Phenol	Semi-volatile Organics
Fluorophenol	Semi-volatile Organics
Tribromophenol	Semi-volatile Organics
Chlorophenol	Semi-volatile Organics
1,2-dichlorobenzene	Semi-volatile Organics
Source: EPA. 1994. <u>Region III Modifications to National Functional Guidelines for Organic Data Review</u> . Multi-media, Multi-Concentration (OLMO1.0 - OLMO1.9).	

4.2.2 Data Quality Audits

The Storage Tank Program Quality Assurance Manager is responsible for coordinating audits of data produced by DEQ staff and the State Lead Contractor for the State Lead Program. The Data Quality Audit will evaluate the quality of data generated by the State Lead Program relative to the Data Quality Objectives. Analytical data sheets will be reviewed to determine if the detection limit for an analysis meets the data quality objectives, the sample was extracted and analyzed within the time limit specified for the method, and the analytical result was not qualified in such a way that might result in a failure to meet the data quality objective.

Data Quality Audits also will evaluate the completeness of documentation related to sample collection and instrument calibration. The Data Quality Audit process primarily involves tracing the documentation that accompanies data from the time of collection to the time that data is used to make decisions. The State Lead Program Manager and a group of Regional Case Managers will assist with all Data Quality Audits.

4.3 Technical Assessments

Technical Assessments will be conducted to assess the sampling and analytical quality control procedures used to generate environmental data at State Lead sites. The DEQ Storage Tank Program will use Technical Assessments to evaluate State Lead procedures described in the Quality Assurance Project Plan. Documents and information in the case files will be evaluated for conformance with State Lead procedures and documentation requirements outlined in the Quality Assurance Project Plan.

The Quality Assurance Manager for the Storage Tank Program is responsible for overseeing Technical Assessments. Regional Case Managers and the State Lead Program Manager also will be involved in the Technical Assessment process. The Storage Tank Program Quality Assurance Manager also may request assistance from other DEQ staff, including the DEQ WQM Quality Assurance Officer, in performing Technical Assessments.

The first Technical Assessment for the State Lead Program will occur approximately one (1) year after the implementation of the Quality Assurance Project Plan. The Storage Tank Program Quality Assurance Manager and the State Lead Program Manager may revise this schedule as necessary to account for changes in the program.

References

EPA. 1995. Innovative Approaches for Validation of Organic and Inorganic Data – Standard Operating Procedures. Region III Analytical Services and Quality Assurance Branch.

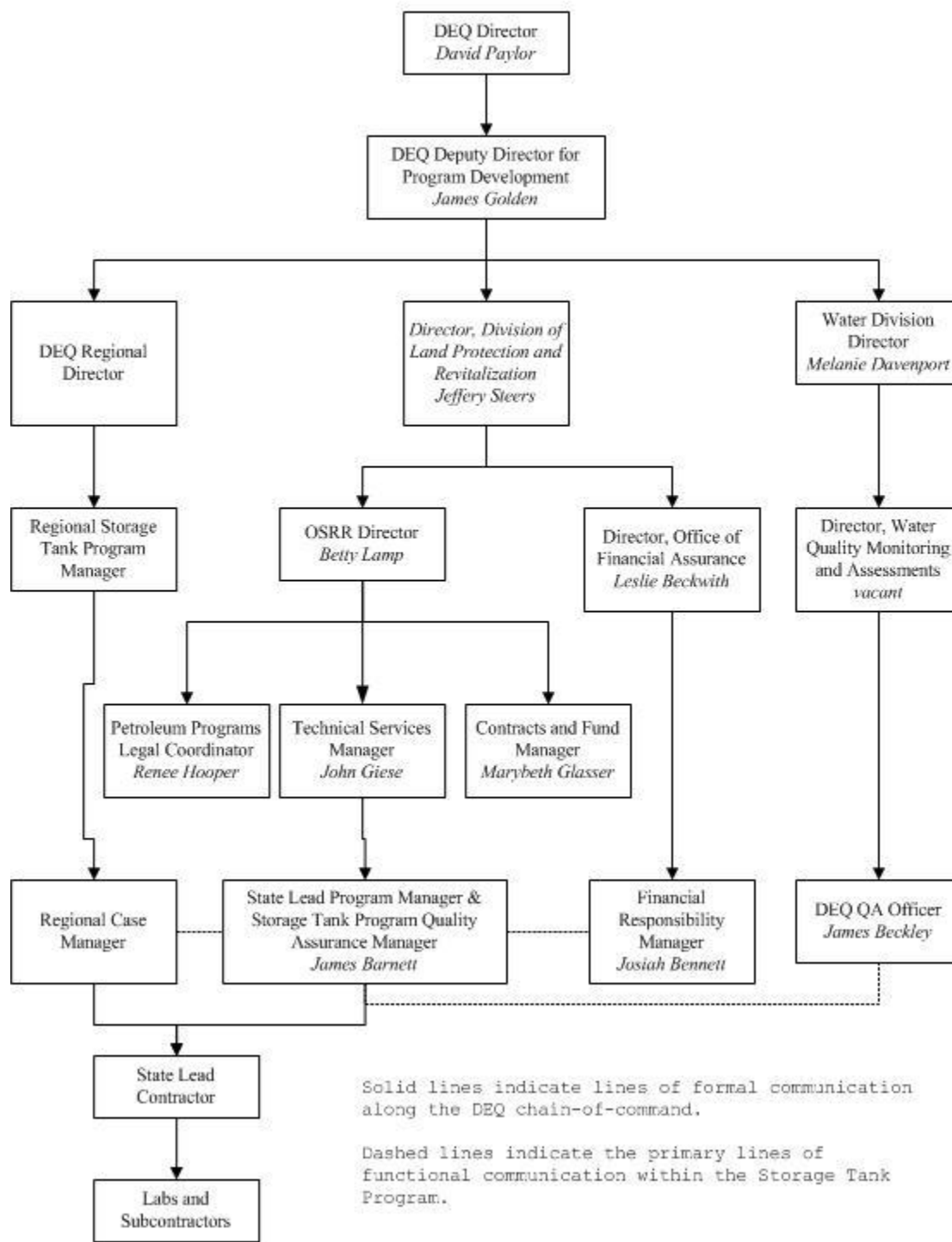
EPA. 1996. Test methods for Evaluating Solid Waste, Physical/Chemical Methods (SW846).

EPA. 1994. Region III Modifications to National Functional Guidelines for Organic Data Review. Multi-media, Multi-Concentration (OLMO1.0 - OLMO1.9).

Appendix A

State Lead Program Organizational Chart

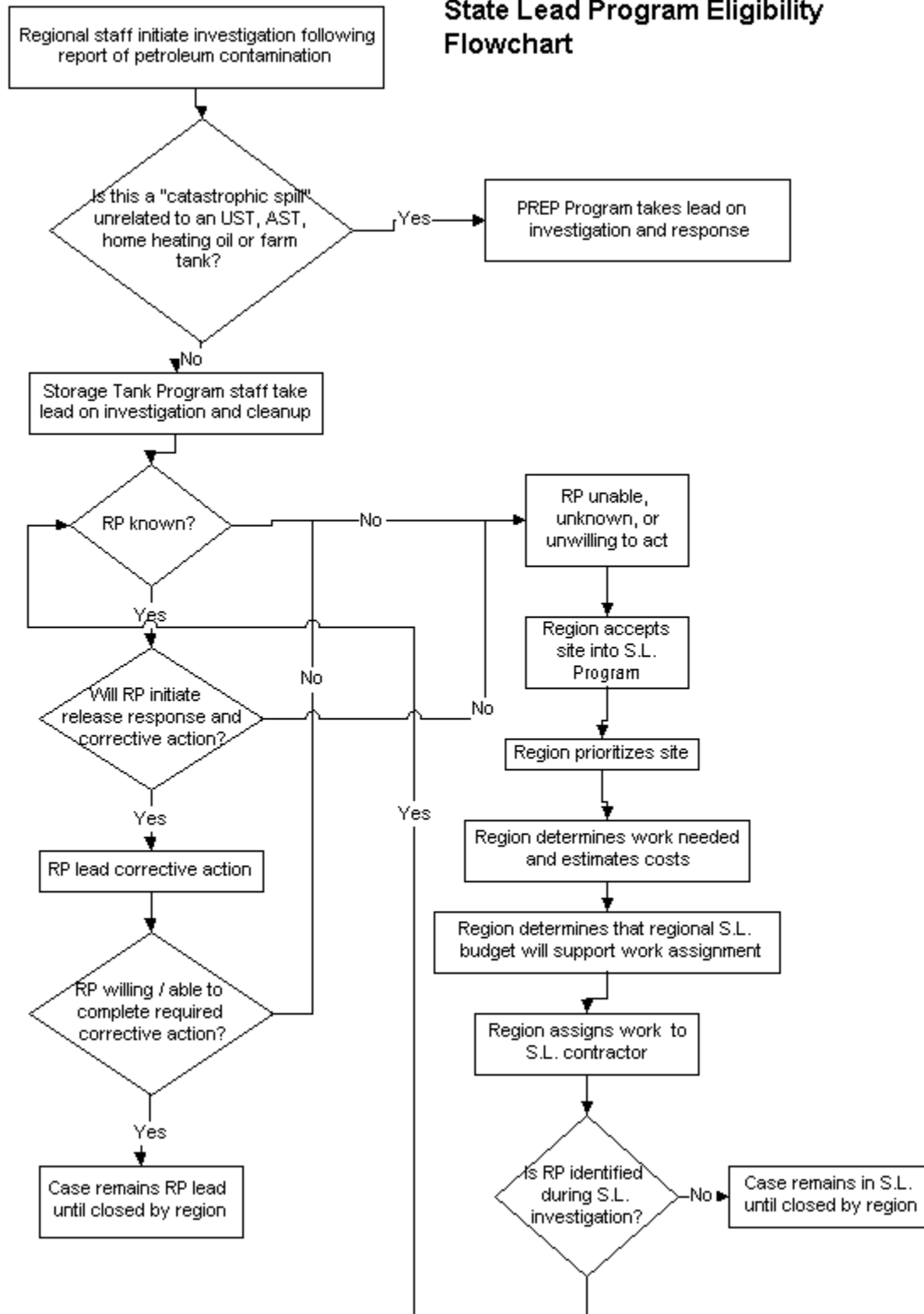
State Lead Program Organizational Chart



Appendix B

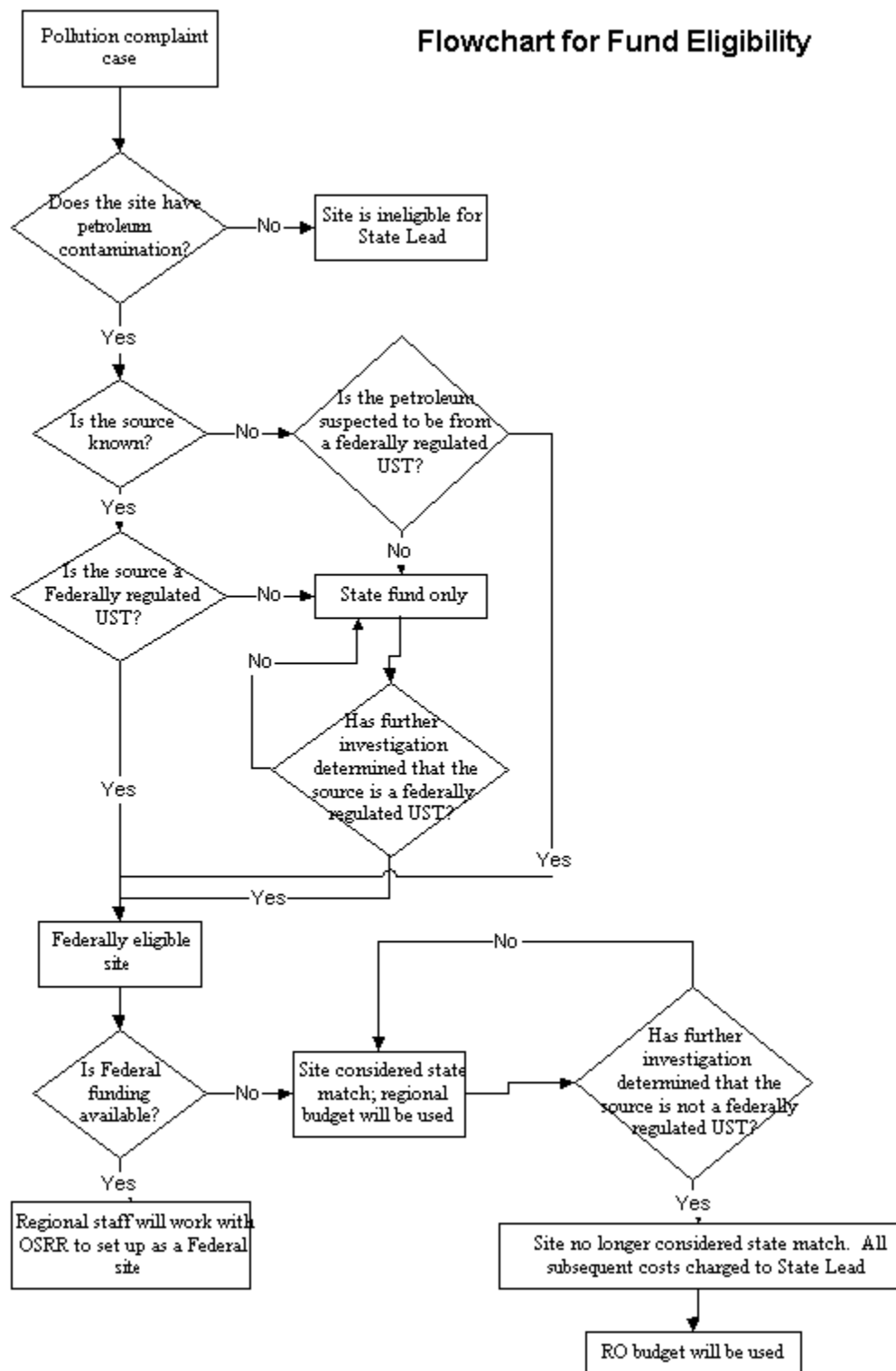
Flowchart for Determining State Lead Program Eligibility

State Lead Program Eligibility Flowchart



Appendix C

Flowchart for Fund Eligibility



APPENDIX D

Analytical Method Requirements

Analytical Method Requirements – Water Samples Collected from a Potable Water Supply Well or System						
Parameter	Sample Preparation /Extraction Method	Analytical Method	Required Reporting Level ⁴	Sample container	Preservation	Holding time
VOCs ²	5030B ³	8260B ³	> method detection limit ⁵	Glass with PTFE lined septum	cool to ≤6°C .008% Na ₂ S ₂ O ₃ ¹	14 days
	NA	EPA 524.2	> method detection limit ⁵	40 – 120 ml glass vial w. PTFE-faced silicon septum (collect samples in duplicate)	25 mg ascorbic acid or 3 mg sodium thiosulfate per 40 ml sample volume ¹ , Adjust pH to < 2 (4 drops 1:1 HCL per 40 ml sample volume), cool to ≤4°C	14 days
SVOCs	3510C ³ or 3520C ³	8270C ³	> method detection limit ⁵	Glass with PTFE lined cap	cool to ≤6°C, store in dark, .008% Na ₂ S ₂ O ₃ ¹	7 days until extraction, 40 days after extraction
	NA	EPA 525	> method detection limit ⁵	1-liter or 1-qt. Amber glass bottle w. PTFE lined cap	40-50 mg sodium sulfite ¹ , adjust pH to < 2 w HCL, cool to ≤4°C	14 days until extraction, 30 days after extraction
BTEX & MTBE	5030B ³	8021B ³	> method detection limit ⁵	Glass with PTFE lined septum	cool to ≤6°C, .008% Na ₂ S ₂ O ₃ ¹	14 days
Ethylene dibromide	5030B ³	8011	> method detection limit ⁵	Glass with PTFE lined septum	cool to ≤6°C	14 days

¹ add to remove free chlorine if chlorine is expected
² Analyses must report concentration of MTBE, DIPE, TAME, and TBA. Also, analysis should be run for sufficient time to allow naphthalene to elute from the GC.
³ Method from SW 846
⁴ The State Lead Contractor must immediately notify the Case Manager upon receipt of any analytical results indicating impact to a water supply. Required analytical method reporting levels are specified in Appendix E.
⁵ Analytical methods used to evaluate constituents in drinking water must, at a minimum, meet the method reporting levels for target analytes in water supplies as listed in Appendix E. The DEQ has a no tolerance practice for petroleum constituents in drinking water and all constituents found above the method detection limit must be reported.

Analytical Method Requirements – Ground Water Samples (not collected from a water supply) and Surface Water Samples						
Parameter	Sample Preparation/Extraction Method ³	Analytical Method(s) ³	Required Reporting Level ⁴	Sample container	Preservation	Holding time
BTEX & MTBE	5030B	8021B	> method detection limit ¹	Glass with PTFE lined septum	cool to ≤6°C	14 days
VOCs	5030B	8260B	> method detection limit ¹	Glass with PTFE lined septum	cool to ≤6°C	14 days
SVOCs	3510C or 3520C	8270C	> method detection limit ¹	Glass with PTFE lined cap	cool to ≤6°C, store in dark,	7 days until extraction, 40 days after extraction
PAHs	3510C or 3520C	8270C or 8100	> method detection limit ¹	Glass with PTFE lined cap	cool to ≤6°C, store in dark,	7 days until extraction, 40 days after extraction
TPH – GRO	5030B	8015C – GRO	> method detection limit ¹ 1 mg/l ²	Glass with PTFE lined septum	cool to ≤6°C	14 days
TPH - DRO	3510C or 3520C	8015C – DRO	> method detection limit ¹ 1 mg/l ²	Glass with PTFE lined cap	cool to ≤6°C	7 days until extraction, 40 days after extraction

¹ Tank owners/operators are required to report the presence of any constituent > detection limit for samples collected at times other than tank closure. The method reporting levels for VOCs and SVOCs listed in Appendix E should be used for ground water samples and surface water samples. The method detection limit for BTEX and MTBE analyzed via method 8021B must not exceed 5 ug/l. The method detection limit for TPH by 8015 C must not exceed 250 ug/l.

² The reporting threshold for water samples collected during tank closure is 1 mg/l.

³ Analytical methods are from SW 846. Other methods may be used as deemed appropriate by the Case Manager and State Lead Contractor.

⁴ Required laboratory reporting levels are specified in Appendix E.

NOTE: The requirements listed in this table are for SW 846 methods. Consultants performing work on this contract may use EPA drinking water or wastewater methods as approved by the Regional Case Manager.

Analytical Method Requirements – Wastewater discharged to surface water via a point source						
Parameter	Sample Preparation Method ¹	Analytical Method(s)	Effluent Limit	Sample container	Preservation	Holding time
All discharges						
pH	NA	EPA 150.1 or SW846 9040B	pH <6 or >9	NA	NA	NA
gasoline contaminated wastewater discharged to freshwaters not listed as public water supplies						
BTEX & MTBE	5030B	SW846 8021B	Benzene >50 ug/l Toluene > 175 ug/l Ethylbenzene > 320 ug/l Xylenes > 33 ug/l MTBE > 1840 ug/l	Glass with PTFE lined septum	cool to ≤6°C	14 days
Total recoverable lead	NA	SW846 7421 or EPA 239.2	Lead conc. > $e^{(1.273(\ln \text{ hardness})) - 3.259}$	Polyethylene or glass	HNO ₃ to pH < 2	6 months
hardness	NA		No limit, used to calculate the lead effluent limit. The minimum value that can be used is 25 mg/l	NA	NA	NA
Ethylene dibromide	5030B	SW846 8260B or EPA 624	5.3 ug/l	Glass with PTFE lined septum	cool to ≤6°C	14 days
1,2 dichloroethane	5030B	SW846 8260B or EPA 624	990 ug/l	Glass with PTFE lined septum	cool to ≤6°C	14 days
Ethanol	5031 or 5032	SW846 8015C	4100 ug/l	Glass with PTFE lined septum	cool to ≤6°C	14 days
gasoline contaminated wastewater discharged to saltwater						
BTEX & MTBE	5030B	SW846 8021B	Benzene >50 ug/l Toluene > 500 ug/l Ethylbenzene > 4.3 ug/l Xylenes > 74 ug/l MTBE > 440 ug/l	Glass with PTFE lined septum	cool to ≤6°C	14 days
Total recoverable lead	NA	SW846 7421	Lead > 8.5 ug/l	Polyethylene or glass	HNO ₃ to pH < 2	6 months
Ethylene dibromide	5030B	SW846 8260B or EPA 624	5.3 ug/l	Glass with PTFE lined septum	cool to ≤6°C	14 days
1,2 dichloroethane	5030B	SW846 8260B or EPA 624	990 ug/l	Glass with PTFE lined septum	cool to ≤6°C	14 days
Ethanol	5031 or 5032	SW846 8015C	4100 ug/l	Glass with PTFE lined septum	cool to ≤6°C	14 days

Analytical Method Requirements – Wastewater discharged to surface water via a point source, continued						
gasoline contaminated wastewater discharged to waters listed as public water supplies						
BTEX & MTBE	5030B	SW846 8021B	Benzene >12 ug/l Toluene > 175 ug/l Ethylbenzene > 320 ug/l Xylenes > 33 ug/l MTBE > 15 ug/l	Glass with PTFE lined septum	cool to ≤6°C	14 days
Total recoverable lead	NA	SW846 7421 or EPA 239.2	Lead conc. > $e^{(1.273(\ln \text{hardness})) - 3.259}$ or 15 ug/l	Polyethylene or glass	HNO ₃ to pH < 2	6 months
hardness	NA		No limit, used to calculate the lead effluent limit. The minimum value that can be used is 25 mg/l	NA	NA	NA
Ethylene dibromide	5030B	SW846 8011 or EPA 504.1	.169 ug/l	Glass with PTFE lined septum	Method 8011 cool to ≤6°C, Method 504.1 cool to ≤4°C	14 days
1,2 dichloroethane	5030B	SW846 8260B or EPA 624	3.8ug/l	Glass with PTFE lined septum	cool to ≤6°C	14 days
Ethanol	5031 or 5032	SW846 8015C	4100 ug/l	Glass with PTFE lined septum	cool to ≤6°C	14 days
Discharges of wastewater contaminated by petroleum products other than gasoline into freshwater						
Naphthalene	3510C or 3520C	SW846 8100 or 8270C	Naphthalene > 10 ug/l	Glass with PTFE lined cap	cool to ≤6°C, store in dark,	7 days until extraction, 40 days after extraction
TPH	3510C or 3520C	SW846 8015 C – DRO	TPH > 15 mg/l	Glass with PTFE lined cap	cool to ≤6°C, store in dark,	7 days until extraction, 40 days after extraction
Discharges of wastewater contaminated by petroleum products other than gasoline into saltwater						
Naphthalene	3510C or 3520C	SW846 8100 or 8270C	Naphthalene > 8.9 ug/l	Glass with PTFE lined cap	cool to ≤6°C, store in dark,	7 days until extraction, 40 days after extraction
TPH	3510C or 3520C	SW846 8015C – DRO	TPH > 15 mg/l	Glass with PTFE lined cap	cool to ≤6°C, store in dark,	7 days until extraction, 40 days after extraction

¹ All sample preparation/extraction methods are from SW846.

The effluent limits listed in this table are from the General VPDES Permit Regulation for Petroleum Contaminated Sites, Groundwater Remediation, and Hydrostatic Tests. State Lead Contractors performing work at state lead sites must meet these effluent limits when discharging wastewater to surface water. The DEQ, however, does not issue permits to itself and, therefore, will not issue a permit to a State Lead contractor performing work at a state lead site.

Analytical Method Requirements – Soil Samples						
Parameter	Sample Preparation/Extraction Method ³	Analytical Method(s) ³	Required Reporting Level	Sample container	Preservation	Holding time
BTEX & MTBE	5035 ⁴	8021B	> method detection limit ¹	A. Glass jar w. screw on cap and Teflon lined lid; or B. Method approved volumetric soil collection/storage devices (e.g. Encore) and accompanying glass vial of soil to determine soil dry weight.	cool to ≤6°C see ⁵ below	14 days
VOCs	5035 ⁴	8260B	> method detection limit ¹	A. Glass jar w. screw on cap and Teflon lined lid; or B. Method approved volumetric soil collection/storage devices (e.g. Encore) and accompanying glass vial of soil to determine soil dry weight.	cool to ≤6°C see ⁵ below	14 days
SVOCs	3540C or 3550	8270C	> method detection limit ¹	Glass jar w. screw-on top and Teflon lined lid	cool to ≤6°C	14 days
PAHs	3540C or 3550	8270C or 8100	> method detection limit ¹	Glass jar w. screw-on top and Teflon lined lid	cool to ≤6°C	14 days
TPH – GRO	5035 ⁴	8015B – GRO	> method detection limit ¹ 100 mg/kg ²	A. Glass jar w. screw on cap and Teflon lined lid; or B. Method approved volumetric soil collection/storage devices (e.g. Encore) and accompanying glass vial of soil to determine soil dry weight	cool to ≤6°C see ⁵ below	14 days
TPH - DRO	3540C or 3550	8015B – DRO	> method detection limit ¹ 100 mg/kg ²	Glass jar w. screw-on top and Teflon lined lid	cool to ≤6°C	14 days

¹ Tank owners/operators are required to report the presence of any constituent > detection limit for samples collected at times other than tank closure.
² The reporting threshold for soil samples collected during tank closure is 100 mg/kg TPH.
³ Sample preparation/extraction and analytical methods are from SW846. Other methods may be used as deemed appropriate by the DEQ Case Manager and the State Lead Contractor.
⁴ Unless otherwise decided upon by both the DEQ Case Manager and the State Lead Contractor, soil samples will be prepared by the “high concentration” method specified in 5035.
⁵ Field preservation with methanol is acceptable using method 5035. Generally, methanol preservation is not used in the Storage Tank Program and is not covered further in this document. The DEQ Case Manager and the State Lead Contractor may use methanol preservation in the field if they believe that this action will best meet the data quality needs at the site.

Appendix E

VOC and SVOC Target Analytes for Water Analyses and Typical Laboratory Reporting Level Requirements

VOC Target Analytes in Water and Method Reporting Level Requirements		
Constituent	CAS #	Method Reporting Level Requirements
Benzene	71-43-2	2 ug/l
Toluene	108-88-3	2 ug/l
Ethylbenzene	100-41-4	2 ug/l
Xylenes	1330-20-7	2 ug/l
Methyl t butyl ether (MTBE)	1634-04-4	2 ug/l
Acetone	67-64-1	10 ug/l
t-amyl alcohol (TAA)	75-85-4	20 ug/l
t-amyl methyl ether (TAME)	994-05-8	2 ug/l
Bromodichloromethane	75-27-4	2 ug/l
Bromoform	75-25-2	2 ug/l
Bromomethane	74-83-9	2 ug/l
Tertiary butanol (TBA)	75-65-0	15 ug/l
2-butanone (MEK)	78-93-3	10 ug/l
Carbon disulfide	75-15-0	2 ug/l
Carbon tetrachloride	56-23-5	2 ug/l
Chlorobenzene	108-90-7	2 ug/l
Chloroethane	75-00-3	2 ug/l
Chloroform	67-66-3	2 ug/l
Chloromethane	74-87-3	2 ug/l
Dibromochloromethane	124-48-1	2 ug/l
1,2 dibromo-3 chloropropane	96-12-8	2 ug/l (Method 8260B)
1,2 dibromo-3 chloropropane	96-12-8	.05 ug/l (Method 8011) ^a
1,2 dibromomethane (EDB)	106-93-4	2 ug/l (Method 8260B)
1,2 dibromomethane (EDB)	106-93-4	.05 ug/l (Method 8011) ^a
1,2 dichloroethane	107-06-2	2 ug/l
1,2 dichloropropane	78-87-5	2 ug/l
Trans 1,3 dichloropropene	10061-02-6	2 ug/l
Trans 1,2 dichloroethene	156-60-5	2 ug/l
Cis 1,3 dichloropropene	10061-01-6	2 ug/l
Cis 1,2 dichloroethene	156-59-2	2 ug/l
Ethyl t butyl ether (ETBE)	637-92-3	2 ug/l
2-hexanone	591-78-6	10 ug/l
Isopropyl ether (DIPE)	108-20-3	2 ug/l
4-methyl 2 pentanone	108-10-1	2 ug/l
Methylene chloride	75-09-2	2 ug/l
Styrene	100-42-5	2 ug/l
1,1,2,2 tetrachloroethane	79-34-5	2 ug/l
Tetrachloroethene	127-18-4	2 ug/l
1,1,1 trichloroethane	71-55-6	2 ug/l
1,1,2 trichloroethane	79-00-5	2 ug/l
Trichloroethene	79-01-6	2 ug/l
vinyl chloride	75-01-4	2 ug/l
^a Typically, only drinking water samples will be analyzed by method 8011 and only when a leaded gasoline source is suspected.		

SVOC Target Analytes in Water and Method Reporting Level Requirements		
Constituent	CAS #	Method Reporting Level Requirements
Acenaphthene	83-32-9	2 ug/l
Acenaphthylene	208-96-8	2 ug/l
Anthracene	120-12-7	2 ug/l
Benzo (a) anthracene	56-55-3	2 ug/l
Benzo (a) pyrene	50-32-8	2 ug/l
Benzo (b) flouranthene	205-99-2	2 ug/l
Benzo (g,h,i) perylene	191-24-2	2 ug/l
Benzo (k) flouranthene	207-08-9	2 ug/l
Chrysene	218-01-9	2 ug/l
Dibenz (a,h) anthracene	53-70-3	2 ug/l
Flouranthene	206-44-0	2 ug/l
Flourene	86-73-7	2 ug/l
Indeno 1,2,3-cd) pyrene	193-39-5	2 ug/l
2 methylnaphthalene	91-57-6	2 ug/l
Naphthalene	91-20-3	2 ug/l
Phenanthrene	85-01-8	2 ug/l
Pyrene	129-00-0	2 ug/l

Appendix F
State Lead Program - Quality Assurance Project Plan Distribution
List

State Lead Program - Quality Assurance Project Plan Distribution List

Karen Crumlish, EPA Region III, Subtitle I Program Manager for Virginia

James Barnett, Virginia DEQ State Lead Program Manager

John Giese, Virginia DEQ, Remediation Programs Manager, Office of Spill Response and Remediation

Elizabeth Lamp, Virginia DEQ, Director, Office of Spill Response and Remediation

James Beckley, Virginia DEQ, QA Officer

Dan Manweiler, Storage Tank Program Manager, Southwest Regional Office

David Miles, Storage Tank Program Manager, Blue Ridge Regional Office

R. McChesney Sterrett, Storage Tank Program Manager, Valley Regional Office

Robyne Bridgman, Storage Tank Program Manager, Piedmont Regional Office

Cynthia Sale, Storage Tank Program Manager, Northern Regional Office

Eugene Siudyla, Geologist Supervisor, Tidewater Regional Office

David Haney, Advanced Environmental, Inc.

Chris Cheatham, Apex Companies, LLC

Charlie Crawford, Crawford Environmental Services

Joe Vance, Marshall Miller and Associates

Bob Sawyer, Total Environmental Concepts, Inc.

Jim Trimble, Vista Environmental, Inc.